

AMENDMENTS TO CLAIMS

Please cancel claims 1, 22-31, 33-36, 38, 40, 43, 61, 63, 65, and 67, and amend claims 3-15, 18-20, 32, 37, 39, 44, 45, 47-49, 51-53, 55-57, and 59. Claims 2, 16, and 17 were previously canceled, claims 41, 42, 46, 50, 54, and 58 were previously withdrawn. All pending claims are reproduced below, including those that remain unchanged.

1. (Canceled).
2. (Canceled).
3. (Currently amended) The A method of ~~claim 1~~ for shaping optical elements, comprising:
 - creating an annular plasma;
 - injecting a flow of a species into the annulus center of the annular plasma to create at least one reactive species; and
 - using reactive atom plasma processing for the damage-free shaping of a surface.
4. (Currently amended) The A method of ~~claim 1~~ for shaping elements out of silicon, comprising:
 - creating an annular plasma;
 - injecting a flow of a species into the annulus center of the annular plasma to create at least one reactive species; and
 - using reactive atom plasma processing for the damage-free shaping of a surface.
5. (Currently amended) The A method of ~~claim 1~~ for shaping silica glass optics, comprising:
 - creating an annular plasma;
 - injecting a flow of a species into the annulus center of the annular plasma

to create at least one reactive species; and
using reactive atom plasma processing for the damage-free shaping of a
surface.

6. (Currently amended) ~~The A method of claim 1~~ for shaping aspheric optics,
comprising:
creating an annular plasma;
injecting a flow of a species into the annulus center of the annular plasma
to create at least one reactive species; and
using reactive atom plasma processing for the damage-free shaping of a
surface.
7. (Currently amended) The method of claim 21 operating in a subtractive manner.
8. (Currently amended) ~~The A method of claim 1~~ for shaping surfaces, comprising:
creating an annular plasma;
injecting a flow of a species into the annulus center of the annular plasma
to create at least one reactive species;
using reactive atom plasma processing for the damage-free shaping of a
surface; and
operating so as not to leave behind a contaminated redeposition layer.
9. (Currently amended) The method of claim 21 using a plume of the plasma.
10. (Currently amended) The method of claim 21 using a plume of the plasma
operating as a sub-aperture tool.
11. (Currently amended) The method of claim 21 wherein a plume of the plasma is
translated across a workpiece.
12. (Currently amended) ~~The A method of claim 1 wherein~~ for shaping surfaces,

comprising:

creating an annular plasma;

injecting a flow of a species into the annulus center of the annular plasma

to create at least one reactive species;

using reactive atom plasma processing for the damage-free shaping of a surface; and

monitoring an emission spectrum is monitored to determine process rates.

13. (Currently amended) ~~The A method of claim 1~~ for shaping surfaces, comprising:

creating an annular plasma;

injecting a flow of a species into the annulus center of the annular plasma

to create at least one reactive species;

using reactive atom plasma processing for the damage-free shaping of a surface; and

using carbon tetrafluoride (CF₄) in argon to create the plasma.

14. (Currently amended) ~~The A method of claim 1~~ for shaping surfaces, comprising:

creating an annular plasma;

injecting a flow of a species into the annulus center of the annular plasma

to create at least one reactive species;

using reactive atom plasma processing for the damage-free shaping of a surface; and

using C₂F₆ in argon to create the plasma.

15. (Currently amended) ~~The A method of claim 1~~ for shaping surfaces, comprising:

creating an annular plasma;

injecting a flow of a species into the annulus center of the annular plasma

to create at least one reactive species;

using reactive atom plasma processing for the damage-free shaping of a surface; and

using sulfur hexafluoride (SF₆) in argon to create the plasma.

16. (Canceled).
17. (Canceled).
18. (Currently amended) The method of claim 21 operating in an additive manner.
19. (Currently amended) The method of claim 21 for removing damage introduced by previous process steps.
20. (Currently amended) The method of claim 21 for removing surface roughness.
21. (Previously presented) A method for shaping surfaces, comprising:
 - injecting a flow of a species into the center of an annular plasma to create at least one reactive species; and
 - using reactive atom plasma processing to shape and polish a surface.
22. (Canceled).
23. (Canceled).
24. (Canceled).
25. (Canceled).
26. (Canceled).
27. (Canceled).
28. (Canceled).
29. (Canceled).

30. (Canceled).
31. (Canceled).
32. (Currently amended) The method of claim 21, further comprising:
using the at least one reactive species to react with selected materials
which comprise the surface.
33. (Canceled).
34. (Canceled).
35. (Canceled).
36. (Canceled).
37. (Currently amended) The method of claim 362 including the step of moving at
least one of the plasma and the surface relative to the other.
38. (Canceled).
39. (Currently amended) The method of claim ~~3866~~ including the step of moving at
least one of the plasma and the surface relative to the other.
40. (Canceled).
41. (Withdrawn) A method to clean a surface, comprising:
creating a plasma;
using a species which has been selected in order to react with selected
materials which comprise the surface and which reactive species does not
react with other materials of the surface;

injecting a flow of the species into the center of the plasma to create reactive species; and
using reactive atom plasma processing to selectively clean the surface by allowing the reactive species to react with the selected materials which comprise the surface without reacting with other materials of the surface.

42. (Withdrawn) The method of claim 41 including the step of moving at least one of the plasma and the surface relative to the other.
43. (Canceled).
44. (Currently amended) The method of claim ~~360~~ operated at one of above and below atmospheric pressure.
45. (Currently amended) The method of claim ~~3862~~ operated at one of above and below atmospheric pressure.
46. (Withdrawn) The method of claim 41 operated at one of above and below atmospheric pressure.
47. (Currently amended) The method of claim ~~4366~~ operated at one of above and below atmospheric pressure.
48. (Currently amended) The method of claim ~~360~~ operable on one of a conductive surface, a non-conductive surface, and a semiconductor surface.
49. (Currently amended) The method of claim ~~3862~~ operable on one of a conductive surface, a non-conductive surface, and a semiconductor surface.
50. (Withdrawn) The method of claim 41 operable on one of a conductive surface, a non-conductive surface, and a semiconductor surface.

51. (Currently amended) The method of claim ~~4366~~ operable on one of a conductive surface, a non-conductive surface, and a semiconductor surface.
52. (Currently amended) The method of claim ~~360~~ wherein the step of using reactive atom plasma processing to selectively shape the surface is a deterministic step which can be selectively in one of an additive mode and a subtractive mode.
53. (Currently amended) The method of claim ~~3862~~ wherein the step of using reactive atom plasma processing to selectively shape the surface is a deterministic step which can be selectively in one of an additive mode and a subtractive mode.
54. (Withdrawn) The method of claim 41 wherein the step of using reactive atom plasma processing to selectively shape the surface is a deterministic step which can be selectively in one of an additive mode and a subtractive mode.
55. (Currently amended) The method of claim ~~4366~~ wherein the step of using reactive atom plasma processing to selectively shape the surface is a deterministic step which can be selectively in one of an additive mode and a subtractive mode.
56. (Currently amended) The method of claim ~~360~~ operated at about atmospheric pressure and at one of above and below room temperature.
57. (Currently amended) The method of claim ~~3862~~ operated at about atmospheric pressure and at one of above and below room temperature.
58. (Withdrawn) The method of claim 41 operated at about atmospheric pressure and at one of above and below room temperature.
59. (Currently amended) The method of claim ~~4366~~ operated at about atmospheric pressure and at one of above and below room temperature.

60. (Previously presented) A method for shaping surfaces, comprising:
creating an annular plasma;
injecting a flow of a species into the center of the annular plasma to create
at least one reactive species; and
using reactive atom plasma processing for the damage-free shaping of a
surface to fit a pre-determined contour.
61. (Canceled).
62. (Previously presented) A method for shaping surfaces, comprising:
creating an annular plasma;
injecting a flow of a species into the center of the annular plasma to create
at least one reactive species; and
shaping a surface deterministically and damage-free to fit a pre-
determined contour.
63. (Canceled).
64. (Previously presented) A method for shaping surfaces, comprising:
creating an annular plasma;
injecting a flow of a species into the center of the annular plasma to create
at least one reactive species; and
using reactive atom plasma processing for the damage-free and
deterministic shaping of a surface by at least one of:
selecting a part of the surface to shape;
selecting a material to shape on the surface; and
controlling the removal rate of a material on the surface under
shaping.
65. (Canceled).

66. (Previously presented) A method for shaping surfaces, comprising:
- creating an annular plasma;
 - injecting a flow of a species into the center of the annular plasma to create at least one reactive species; and
 - shaping a surface deterministically and damage-free by at least one of:
 - selecting a part of the surface to shape;
 - selecting a material to shape on the surface; and
 - controlling the removal rate of a material on the surface under shaping.
67. (Canceled).